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IS 11188-3 (1991): Vault (Strong room) doors, Part 3: Tests for fire resistance [MED 24: Security Equipment]



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“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक
वाल्ट (कोष-कक्ष) के दरवाजे
भाग 3 अग्नि प्रतिरोधी परीक्षण
(पहला पुनरीक्षण)

Indian Standard
VAULT (STRONG ROOM) DOORS
PART 3 TESTS FOR FIRE RESISTANCE
(*First Revision*)

UDC 69·028·1 : 620·193·5

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FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Safes Sectional Committee had been approved by the Heavy Mechanical Engineering Division Council.

Vault (strong room) doors are used mainly in banking industry to protect the contents of vaults (strong rooms) from burglarious attack and also against damage to valuables from fire. These doors may also be used by other organizations like financial institutions, commercial, industrial, defence and mercantile organizations.

Earlier the vault doors and strong room doors were considered to be two different items. Hence IS 11188 : 1985 'Vault doors' was laying down requirements of vault doors and IS 7152 : 1974 'Strong room doors' was covering the requirements of strong room doors. Under the present circumstances the vault doors and strong room doors are considered to be synonymous. Hence during the revision of IS 11188, its scope has been modified to cover the requirements of vault (strong room) doors. Subsequently IS 7152 will be withdrawn.

During the revision of IS 11188, the necessity has also been felt to lay down the performance requirements for vault doors against burglarious attacks and fire resistances. Hence the revision of IS 11188 has been prepared in the following parts to cover the various aspects:

Part 1 Specification

Part 2 Tests for burglary resistance

Part 3 Test for fire resistance

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (revised)'.

Indian Standard

VAULT (STRONG ROOM) DOORS

PART 3 TESTS FOR FIRE RESISTANCE

(First Revision)

1 SCOPE

1.1 This standard (Part 3) lays down the method of tests for accessing the fire resistance capacity of vault (strong room) doors.

1.2 It is intended that the tests shall register performance during the period of exposure to fire and shall not be construed as having determined suitability of doors for use after fire exposure.

2 TERMINOLOGY

2.1 Unexposed Face

It refers to the side which is on the inside of the strong room door.

2.2 Exposed Face

It refers to the side which is on the outside of the strong room door.

3 SAMPLE FOR TESTING

Two samples known to be fully representative of a lot of vault doors of similar design and construction shall be selected on the basis of random sampling by inspecting agency.

4 TESTS

4.1 Tests for verifying the fire resistant property of vault (strong room) doors consist of fire endurance test and fire-hose-stream-reheat test. For this purpose one sample each, selected in accordance with 3 shall be subjected to fire endurance test (see 4.4) and fire-hose-stream-reheat test (see 4.5).

4.2 Test Equipment

4.2.1 Thermocouples

The thermocouples enclosed in protection tubes of suitable materials and dimensions shall have time constant of the protected thermocouple assembly within the range of 5 to 7.2 minutes.

4.2.1.1 A typical thermocouple assembly complying with these time constant requirements may be fabricated by fusion-welding the twisted ends of chromel-alumel wires (0.52 mm² to 0.82 mm²), mounting the leads in porcelain insulators and inserting the assembly so that the thermocouple bead is 12 mm from the

sealed end of a standard weight nominal 12 mm iron, steel or inconel pipe.

4.2.2 Furnace

4.2.2.1 The furnace fuel and air supplies shall be adjusted such that the fire is uniformly distributed over the exposed face of the door and regulated to temperatures in accordance with the standard time temperature curve. The furnace temperature corresponding to time elapsed shall be as given below:

Time, min	Furnace Temp, °C
5	538
10	704
15	760
20	793
25	821
30	843
40	878
50	905
60	927

4.2.2.2 The furnace temperature shall be deemed to be the average temperature obtained from the readings of not less than nine thermocouples symmetrically distributed near all parts of the test assembly. The hot junction of the thermocouple shall be 50 mm apart from the exposed face of the door or masonry in which the door is installed, during the entire test exposure.

4.2.2.3 The accuracy of the furnace temperature control shall be such that the area under the time temperature curve, obtained by averaging all the furnace thermocouple readings, shall be within 10 percent of the corresponding area under the standard time temperature curve.

4.2.3 Contents

Contents of the insulated chamber representing vault (strong room), guarded by the door subjected to fire test, shall include file, letter, currency note grade paper, record form paper (printed, typed or handwritten).

4.3 Preparation for Tests

4.3.1 The door to be tested shall be mounted into a wall of the kind and thickness in accordance with the installation instructions furnished by the manufacturer. The door mounted on wall shall be placed in front of a furnace in such a manner so that the exposed (outer) face of the door would be subjected to the furnace fire.

4.3.2 The unexposed side of the wall and the unexposed face (inner face) of the door assembly shall be enclosed by an insulated chamber consisting of a box 1.5 metre deep, open at one side. The open side shall fit over a projected area 2.3 metre \times 2.3 metre, built out in the masonry of the test wall into which test sample has been installed. The joints between the masonry and the insulated chamber (radiation chamber) shall be sealed with insulating materials.

4.3.3 Single sheets of paper shall be placed in the interior of the insulating chamber, arranged on shelves on each side of the door at distance of 150 mm from the door joints and on a stand 910 mm apart from the unexposed face of the wall.

4.3.4 The thermocouples shall be located 50 mm from the unexposed face of the door. A thermocouple shall be placed in the plane of each side door joint, 150 mm down from the top door joint and another in the plane of the top door joint at its middle.

4.4 Fire Endurance Test

4.4.1 Sample of vault door is prepared in the manner specified in 4.3. The furnace shall then be put on and the temperatures shall be read at intervals not exceeding 5 minutes during the test. Average of all the thermocouples inside and outside the doors shall be recorded and shall be taken as required value.

4.4.2 The pressure in the furnace chamber during the test shall be maintained as close as possible to atmospheric pressure.

4.4.3 The furnace fire shall be continued for the period of 30 min. The fire shall then be extinguished and the test sample allowed to cool. The temperature on the interior of the radiation chamber shall be continuously recorded until a definite drop is noted. In order to pass the fire endurance test, it is essential that at no time the temperature at the unexposed face of the door, as shown by the thermocouples placed inside the radiation chamber, during test exceed 177°C.

4.4.4 After the test assembly has cooled to less than 47°C, the stability of the door shall be determined by examining the security of the locking mechanism, fastening between parts,

and the degree of engagement between the door frame and the masonry. The heat insulating properties of the door shall also be examined as evidenced by the usability of the paper contents stored in the radiation chamber, the condition of the finish on the unexposed side of the door, and any other visible evidence of undue transmission of heat.

4.5 Fire-Hose-Stream-Reheat Test

4.5.1 The sample of the door to be subjected to this test shall be mounted as specified in 4.3.1 and 4.3.2. Contents as specified in 4.3.3 shall also be used.

4.5.2 The door assembly shall be subjected to a standard fire exposure in a manner similar to the fire endurance test, for the period of 15 minutes.

4.5.3 After the fire exposure, the sample door shall be subjected to a standard 30 mm hose-stream of water immediately applied from a distance of 6 metre to the exposed face of the door for one minute. The water shall be directed first at the edge of the door assembly and then at all parts of the exposed surfaces; changes in the direction of the water stream shall be made slowly throughout the hose-stream test. The pressure at the nozzle shall be maintained at 207 kPa (2.1 kg/cm²).

4.5.4 The door assembly and its parts shall resist the stresses resulting from the impact and pressure of the water stream, and the contraction due to the cooling effect of the water. No warping or bulging of the door assembly as a whole, dislodging or breakage of the parts, or lack of security of the attachments shall be apparent.

4.5.5 Immediately after the hose-stream has been applied, the door assembly shall again be returned to the original position and exposed to the same fire condition for a further period of 15 minutes. The door assembly shall then be allowed to cool.

4.5.6 After the door assembly has cooled to less than 47°C, the stability of the door shall be determined by examining the security of the locking mechanism, fastening between parts and the degree of engagement between the door and frame and the masonry.

The heat insulating properties of the door shall also be examined as evidenced by the usability of the paper contents stored in the radiation chamber.

5 CRITERIA FOR CONFORMITY

The contents used in the tests shall be considered to be usable after tests if they are able to withstand ordinary handling without crumbling or falling apart and are legible and reproducible by ordinary means.

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